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10/066,618	02/06/2002	Satoshi Okada	03500.016166	4453
5514	7590	11/05/2003	EXAMINER	
FITZPATRICK CELLA HARPER & SCINTO 30 ROCKEFELLER PLAZA NEW YORK, NY 10112			SUNG, CHRISTINE	
			ART UNIT	PAPER NUMBER
			2878	

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/066,618

Applicant(s)

OKADA ET AL.

Examiner

Christine Sung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-20 is/are allowed.
- 6) ☒ Claim(s) 1,2,4-6,8-12,21,23-30,32-42 and 44 is/are rejected.
- 7) ☒ Claim(s) 3,7,22,31 and 43 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 9, 15 and 20 objected to because of the following informalities: The claims all contain a minor spelling error. "Caesium Iodide" should read --Cesium Iodide--. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Regarding claims 1 and 6, the detector apparatus claims contain method steps that are supposed to describe in detail the elements of the apparatus. For example, claims 1 and 6 disclose a radiation detector with various elements, but proceeds to disclose a step of removing projections from the sensor and bonding the sensor pan to the conversion panel.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 4-6, 8-9, 30 and 32-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi (US Patent 6,469,307) in view of Oi (US Patent 6,469,307).

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Regarding claim 1, 6 and 30, Takabayashi discloses a radiation detector or scintillator panel (Figure 1, element 2) having a wavelength conversion member or scintillator (element 16) and a sensor panel (See figures 5 a, element 32 and figure 5b, element 34, and column 4, lines 40-67) wherein the scintillator panel and sensor panels are bonded together. Takabayashi does not specify the smoothing of the bumps or protrusions formed on the surface of the scintillator panel. However, Oi discloses that during scintillator manufacture it is well known in the art to smooth surfaces using mechanical means such as polishing to increase scintillator accuracy (Column 2, lines 39-53). Further, Oi discloses that the facing surfaces of the scintillator, where the radiation impinges are usually made parallel to the (0,1,0) plane, meaning that the if the scintillator crystal was described as a box, the surface would be polished as closely parallel to the top of the box as possible (column 2, lines 17-25). Therefore, it is inherent that it is important to remove any protrusions or bumps along the surface of a scintillator to insure greater scintillator accuracy. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the invention as disclosed by Takabayashi with the smooth scintillator as disclosed by Oi to increase the accuracy of the detection of scintillation events during imaging.

Regarding claims 4 and 8, Takabayashi discloses that the scintillator or wavelength conversion layer is covered with a protective layer (Figure 4 B, element 18).

Regarding claims 5 and 9, Takabayashi discloses that the preferred scintillator is made of Cesium Iodide (Column 4, lines 9-10).

Regarding claim 32-34, Takabayashi discloses that the scintillator panel and sensor panel are bonded together, (see abovementioned paragraphs), but does not specify

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the thickness of the adhesion layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have determined the thickness of the adhesion layer to be less than 50 micrometers or to a desired thickness, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

Further regarding claim 34, Takabayashi in view of Oi discloses the limitation of the respective independent claim but does not specify the step of flowing adhesive material through a gap in order to adhere the scintillator panel to the sensor panel. However, flowing material through a gap is a well known method for inserting adhesive material. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made as it is only a matter of design choice to flow material through a gap to insert an adhesive material.

Regarding claim 35, pressure sensitive adhesives are well known in the art, and therefore it would only involve a matter of design choice to use such adhesives.

Regarding claims 36-39, Oi discloses a mechanical buffing of the surface as a means to reducing the roughness or projections of the surface. It is well known in the art that scraping, crushing, cutting, and lasing are common mechanical techniques used in surface smoothing. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used any of the claimed techniques since it would only involve a matter of design choice.

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6. Claims 10-12, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi (US Patent 6,469,307) in view of Okamura et al (US Patent 6,384,417).

Regarding claims 10-12, 21 and 23 Takabayashi discloses a scintillator panel (Figure 4B), having a wavelength conversion member or scintillator (element 16) formed on a substrate (element 10), and a sensor panel for detecting light converted by the scintillator panel (See figures 5 a, element 32 and figure 5b, element 34, and column 4, lines 40-67) but does not specify that the bumps or projections on surface of the scintillator be made smaller than a threshold value of 50 micrometers. However, Okamura discloses that the surfaces of scintillators are preferably smooth, specifically with a mean roughness of 0.01-0.80 micrometers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the roughness requirements of the scintillator as disclosed by Okamura with the invention as disclosed by Takabayashi, to reduce scattering of light, as Okamura discloses that roughness exceeding 0.80 micrometers increases the scattering of light decreasing luminous efficiency.

7. Claims 2, 24-29 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi (US Patent 6,469,307) in view of Oi (US Patent 6,469,307) further in view of Okamura et al (US Patent 6,384,417).

Regarding claim 2, the limitations set forth in claims 1 have been disclosed in the abovementioned paragraphs. Takabayashi in view of Oi does not specifically disclose that the height of each projection before bonding is 50 micrometers or lower. However, Okamura discloses that the surfaces of scintillators are preferably smooth, specifically

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with a mean roughness of 0.01-0.80 micrometers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the roughness requirements of the scintillator as disclosed by Okamura with the invention as disclosed by Takabayashi in view of Oi, to reduce scattering of light, as Okamura discloses that roughness exceeding 0.80 micrometers increases the scattering of light decreasing luminous efficiency.

Regarding claims 24-27, Oi discloses a mechanical buffing of the surface as a means to reducing the roughness or projections of the surface. It is well known in the art that scraping, crushing, cutting, and lasing are common mechanical techniques used in surface smoothing. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used any of the claimed techniques since it would only involve a matter of design choice.

Regarding claims 28-29 and 40-42, Takabayashi discloses an apparatus for manufacturing a scintillator panel (Figure 4B), having a wavelength conversion member or scintillator (element 16) but does not disclose the specifics of the apparatus. However, Oi discloses that during scintillator manufacture it is well known in the art to smooth surfaces using mechanical means such as polishing to increase scintillator accuracy (Column 2, lines 39-53). Further, Oi discloses that the facing surfaces of the scintillator, where the radiation impinges are usually made parallel to the (0,1,0) plane, meaning that the if the scintillator crystal was described as a box, the surface would be polished as closely parallel to the top of the box as possible (column 2, lines 17-25). Therefore, it is inherent that it is important to remove any protrusions or bumps along the surface of a scintillator to insure greater scintillator accuracy. It would have been obvious to one

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having ordinary skill in the art at the time the invention was made to have used the invention as disclosed by Takabayashi with the smooth scintillator as disclosed by Oi to increase the accuracy of the detection of scintillation events during imaging. However, Takabayashi in view of Oi does not disclose the specifics of determining the threshold or detection of projections. Okamura discloses a specific roughness range of the surface of the scintillator, and further it is inherent that in order to determine the roughness characteristic of the surface of a scintillator, a means for detecting the projections and recesses of the surface must be present, a means for measuring the height difference and a means for comparing the height difference to the predetermined roughness range or threshold. All of these characteristics are inherent to Okamura's invention because the roughness characteristics cannot be determined without these necessary elements. It is well known in the art to measure height differences to calculate roughness, it is well known in the art to set a desired threshold height. In order to determine the roughness of a given surface, the Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the invention disclosed by Takabayashi in view of Oi with the necessary requirements as disclosed by Okamura to have increased the accuracy of the surface smoothing process of the scintillator.

8. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi (US Patent 6,469,307) in view of Oi (US Patent 6,469,307) further in view of Petrillo (US Patent 6,160,259).

The elements listed in claim 44 are well known elements that are frequently used in radiation detection systems. Petrillo et al. discloses the elements as disclosed in the claims (see column 1, line 1-column 14, line 57). It would have been obvious to one



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having ordinary skill in the art at the time the invention was made to have used the elements claimed with the radiation detector panel as disclosed by Takabayashi, as these devices are specifically made for radiation detection devices as disclosed by Petrillo.

***Allowable Subject Matter***

9. Claims 13-20 are allowed.
10. Claims 3, 7, 22, 31 and 43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
11. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 13-20, 22 and 31, none of the prior art of record discloses the specific step of depositing a protective layer and then proceeding to remove the projections or bumps. Although many references such as Oi, disclose mechanical buffing of the surface to attain a uniformly smooth surface, Oi does not specify the deposition of a protective layer before smoothing the surface. Further, protective layers are well known in the art, as demonstrated by Takabayashi, but the addition of these protective layers is after the step of smoothing the surface.

Regarding claims 3, 7 and 43, none of the prior art of record specifically discloses the specified range of resolution response to light of 0.7 or greater.

***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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- a. US Patent 6,563,120- this reference contains a layered scintillator with many of the elements as disclosed by the present invention but cannot be applied due to the filing date.
  - b. US Pre Grant Publication 2003/0173493- this reference discloses a radiation detector including many of the elements disclosed in the instant application.
  - c. US Patent 5,818,035- this reference discloses the conventional method of using cold flow to insert an adhesive.
  - d. US Patent 6,389,096- this reference discloses a conventional pressure sensitive adhesive.
  - e. Us Patent 5,902,491- this reference discloses protrusion removal from surfaces using etching.
  - f. US Patent 6,551,176- this reference discloses a conventional mechanical method of surface projection removal using scraping and cutting techniques.
  - g. US 6,132,942- this reference discloses the conventional method of measuring surface roughness using height differences and setting a desired height threshold for the surface.
13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine Sung whose telephone number is 703-305-0382. The examiner can normally be reached on Monday- Friday 7-4 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 703-308-4852. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Christine Sung  
Examiner  
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CS



**DAVID PORTA**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**